UTILITY PATENT APPLICATION TRANSMITTAL LETTER

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
FQ5-481

To the Assistant Commissioner for Patents:

Transmitted herewith for filing is the patent application of:
Rei MIYAMOTO
corresponding to Japanese application 199510/1999, filed July 13, 1999,
entitled: CALL ADMISSION CONTROL METHOD AND SYSTEM

Enclosed are:

X	15 pages of specification.
X	5 sheets of formal drawings.
X	a newly-executed declaration of the inventor.
	a copy of an executed declaration of the inventor from prior application Serial No. , filed .
	incorporation by reference. The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied as indicated in the preceding box, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
X	an assignment of the invention to NEC CORPORATION, including assignment cover sheet.
	Information Disclosure Statement with Form PTO-1449.
	copies of the Information Disclosure Statement citations.
	preliminary amendment.
X	return receipt postcard (MPEP 503), specifically itemized.
	a verified statement to establish small entity status under 37 CFR 1.9 and 1.27.
	a verified statement to establish small entity status filed in prior application. Status is still proper and desired.
	a certified copy of the Priority Document.
X	other: inventor information sheet.

If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information.*

[] Continuation [] Divisional [] Continuation-in-part (CIP)

of prior application No. , filed .

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UTILITY PATENT APPLICATION TRANSMITTAL LETTER (continued)	Docket No. FQ5-481

CLAIMS AS FILED

	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE			$ 690	$ 690
TOTAL CLAIMS	10 - 20 =	0	x$ 18	0
INDEPENDENT CLAIMS	3 - 3 =	0	x$ 78	0
MULTIPLE DEPENDENT CLAIM PRESENT			$ 260	
			TOTAL	$ 690
If applicant has small entity status under 37 CFR 1.9 and 1.27, then divide total fee by 2, and enter amount here.			**SMALL ENTITY TOTAL**	$

X	A check in the amount of $730 to cover the filing fee is enclosed.
X	The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to Deposit Account No. 25-0120 in the name of Young & Thompson, as described below. A duplicate copy of this sheet is enclosed.
	Charge the amount of $ as filing fee.
X	Credit any overpayment.
X	Charge any additional fee required under 37 CFR 1.16 and 1.17, during the pendency of this application.
	Charge the issue fee set in 37 CFR 1.18 at the mailing of the Notice of Allowance.

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July 13, 2000

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Fax Two::	703-979-4709

APPLICATION INFORMATION

Title Line One::	CALL ADMISSION CONTROL METHOD AND SYSTEM
Total Drawing Sheets::	5
Formal Drawings?::	YES
Application Type::	UTILITY
Docket Number::	FQ5-481

REPRESENTATIVE INFORMATION

Representative Customer Number::	000466

PRIOR FOREIGN APPLICATION

Foreign Application One::	199510/1999
Filing Date::	JULY 13, 1999
Country::	JAPAN
Priority Claimed::	YES

CALL ADMISSION CONTROL METHOD AND SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to call admission control techniques in an ATM (asynchronous transfer mode) switch, and more particularly to call admission control method and system for use in the ATM switch handling QoS(quality of service)-specified and QoS-unspecified virtual connections.

2. Description of the Related Art

In a local-area network (LAN) environment including ATM LANs and legacy LANs, a bandwidth management technique of ATM connections is needed to operate an application requiring a high quality, such as the case of video service.

As an example, a CAC ATM-connection bandwidth management system has been disclosed in Japanese Patent Application Unexamined Publication No. 10-271116. This conventional system is provided with a per-connection bandwidth monitor, allowing CAC (Call Admission Control) information to be calculated and displayed on screen. Further, the conventional system is provided with a simulator for predicting an available connection bandwidth.

Call Admission Control (CAC) is a function of determining whether a connection request is admitted or

denied. More specifically, CAC determines whether the connection request can be accepted at SVC (switched virtual connection) call origination time. The connection request can be accepted only if the QoS for all existing virtual connections would still be satisfied if the request was accepted.

However, the conventional CAC has disadvantages in the case where a network using UBR (unspecified bit rate) traffic as normal traffic such as LAN emulation is connected to another network handling QoS-specified virtual connections such as CBR (constant bit rate) or VBR (variable bit rate) virtual connections.

More specifically, as shown in Fig. 4B, it is assumed that the full bandwidth of a line is B, of which a certain portion A_{QOS} is already assigned to CBR/VBR traffic virtual connections and further a portion is assigned to a UBR traffic virtual connection. In this case, if the requested bandwidth R of a CBR traffic virtual connection is smaller than the available bandwidth $A_F = (B - A_{QOS})$, then the connection request is accepted regardless of the UBR traffic virtual connection, which may cause the UBR-traffic virtual connection to be suddenly disconnected.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide

a call admission control method and system allowing flexible and reliable call admissions at an ATM switch in the case of an ATM network including both QoS-specified and QoS-unspecified virtual connections.

According to the present invention, a call admission control method includes the steps of: a) receiving a QoS (Quality of Service) specified connection request; b) calculating an assigned bandwidth on a link associated with the QoS-specified connection request; c) calculating an estimated bandwidth to be assigned to an existing QoS-unspecified traffic on the link associated with the QoS-specified connection request; and d) determining whether the QoS-specified connection request is accepted, based on a combination of the assigned bandwidth and the estimated bandwidth.

In the step (c), the estimated bandwidth on the link may be obtained based on an average QoS-unspecified traffic of each QoS-unspecified virtual connection existing on the link associated with the QoS-specified connection request. The average QoS-unspecified traffic may be calculated by adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals.

The step (c) may include the steps of: adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals to produce a first average QoS-unspecified traffic; sequentially storing a first average QoS-unspecified traffic each time a

corresponding QoS-unspecified connection is established at the ATM switch; and calculating the estimated bandwidth by averaging a predetermined number of first average QoS-unspecified traffics stored.

The step (d) may include the steps of: adding the assigned bandwidth and the estimated bandwidth to produce an currently assigned bandwidth in the link; calculating an available bandwidth of the link by subtracting the currently assigned bandwidth from a full bandwidth of the link; and determining whether the QoS-specified connection request is accepted, depending on a comparison of the available bandwidth and a requested bandwidth of the QoS-specified connection request.

According to anther aspect of the present invention, a call admission control system in an ATM switch having a plurality of links connected thereto, includes: a traffic monitor for monitoring a QoS-unspecified traffic for each QoS-unspecified connection existing on each link; a memory for storing a cell traffic management table containing an average QoS-unspecified traffic for each QoS-unspecified connection existing on each link; and a call admission manager for calculating an estimated bandwidth by adding up average QoS-unspecified traffics for all existing QoS-unspecified connections on a link associated with a QoS-specified connection request, wherein the estimated bandwidth is a bandwidth to be assigned to the existing QoS-unspecified connections on the link, and determining

whether the QoS-specified connection request is accepted, based on a combination of the estimated bandwidth and an assigned bandwidth that is already assigned in the link.

According to further another aspect of the present invention, a call admission control system in an ATM switch having a plurality of links connected thereto, includes: a traffic monitor for monitoring a QoS-unspecified traffic for each QoS-unspecified connection existing on each link; a calculator for adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals to produce a first average QoS-unspecified traffic, and calculating the estimated bandwidth by averaging a predetermined number of first average QoS-unspecified traffics stored; a memory for storing a cell traffic management database sequentially containing a first average QoS-unspecified traffic each time a QoS-unspecified connection is established at the ATM switch; and a call admission manager for calculating an estimated bandwidth by adding up first average QoS-unspecified traffics for all existing QoS-unspecified connections on a link associated with a QoS-specified connection request, wherein the estimated bandwidth is a bandwidth to be assigned to the existing QoS-unspecified connections on the link, and determining whether the QoS-specified connection request is accepted, based on a combination of the estimated bandwidth and an assigned bandwidth that is already assigned in the link.

Since CAC is performed taking into account the

bandwidth that is already assigned to the existing QoS-unspecified virtual connection, the UBR-traffic communication is prevented from being suddenly disconnected even in the case of occurrence of a request for a QoS-specified virtual connection requiring a bandwidth greater than the current available bandwidth of a corresponding link.

Since a necessary bandwidth is dynamically assigned to the existing UBR-traffic virtual connection, an available bandwidth at that time can be efficiently assigned to a QoS-specified virtual connection request.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing a basic configuration of an ATM switch employing a CAC method according to an embodiment of the present invention;

Fig. 2A is a diagram showing the field structure of a cell traffic management table as shown in Fig. 1;

Fig. 2B is a diagram showing the field structure of a call admission management table employed in the embodiment;

Fig. 3 is a diagram showing an operation of the ATM switch as shown in Fig. 1;

Fig. 4A is a schematic diagram showing a CAC operation according to the embodiment of the present invention;

Fig. 4B is a schematic diagram showing a conventional CAC operation; and

Fig. 5 is a diagram showing a cell traffic management database for use in an ATM switch employing a CAC method according to another embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in Fig. 1, it is assumed for simplicity that an ATM switch has two input ports, two output ports and a control section. The ATM switch according to an embodiment of the present invention is basically structured by input line modules 1 and 2 each connected to the input lines, an ATM cell switch 3, output line modules 4 and 5 each connected to the output lines, CPU/SW interface 6, a data processor (CPU) 10, and a memory 20 storing a cell traffic management table 21.

Each of the input line modules 1 and 2 extracts cells from transmission frames on a corresponding incoming line

and counts the number of received cells for each virtual connection. Each of the input line modules 1 and 2 is provided with a counter for counting received cells. At request of the data processor 10, the receiving cell count is output to the data processor 10 through the CPU/SW interface 6 as described later.

The ATM cell switch 3 performs the routing of cells arriving at each input line to the required output line by mapping the VPI/VCI in the header of the incoming cell into the corresponding output VPI/VCI using virtual connection management information that is previously installed in the ATM cell switch 3. In this way, a cell arriving at each input line module is transferred to the required output line module through the ATM cell switch 3.

Each of the output line modules 4 and 5 is provided with a buffering section for transmission queue management and a counter for counting the number of cells transmitted to a corresponding outgoing line for each virtual connection. At request of the data processor 10, the transmitting cell count is output to the data processor 10 through the CPU/SW interface 6 as described later.

The CPU/SW interface 6 is designed to exchange the signaling protocol for SVC call control and cell traffic data between the ATM cell switch 3 and the data processor 10.

The data processor 10 is a program-controlled processor used for control of the ATM switch. The data processor 10 implements the following functions by software

processing: SVC call controller 11, call admission decision manager 12, and cell traffic computation section 13.

The SVC call controller 11 processes the signaling protocol for setup and release of a SVC call and extracts parameters of bandwidth and traffic type for each call setup request. The extracted parameters are transferred as information necessary for call setup processing to the call admission decision manager 12. Further, the SVC call controller 11 outputs the results of setup and release of a SVC call to the ATM cell switch 3 through the CPU/SW interface 6. In the ATM cell switch 3, the virtual connection management information is updated depending on the received setup and release results.

The call admission decision manager 12 determines whether a connection request is accepted, depending on the parameters of the connection request and the UBR traffic data received from the cell traffic computation section 13. The details will be described later.

The cell traffic computation section 13 adds up the receiving and transmitting cell counts inputted from the input line modules 1 and 2 and the output line modules 4 and 5 and manages the cell traffic management table 21. The details will be described later.

TABLE STRUCTURE

Referring to Fig. 2A, the cell traffic management table 21 can contain N records and has the following fields: Index D31, Line Number D32, VPI value D33, VCI value D34, Average

reception traffic (ART) D35, Average transmission traffic (ATT) D36, and Type of traffic D37. The Line Number D32 indicates an identification number of one of the input line modules and the output line modules. The VPI value D33 and VCI value D34 indicate VPI and VCI in the header of a cell. A combination of the Line number D32, the VPI value D33, and the VCI value D34 identifies a single virtual connection indicated by the Index D31.

The Average reception traffic (ART) D35 indicates the average amount of traffic arriving at the input line module identified by the Line number D32. Similarly, the Average transmission traffic (ATT) D36 indicates the average amount of traffic transmitting from the output line module identified by the Line number D32.

An average traffic may be calculated from the number of cells per second. For example, the cell traffic computation section 13 samples the count value of the counter provided in each of the input and output line modules once per second and then calculates the differential average of 10 sampled counts.

The traffic type D37 indicates the type of the connection identified by the Index S31. Here, the traffic type D37 indicates whether the connection is of UBR traffic. Therefore, the cell traffic computation section 13 can calculate an average reception/transmission traffic of all UBR-traffic virtual connections currently established in a certain input/output line module by adding up N records

contained in the cell traffic management table 21.

Referring to Fig. 2B, a call admission management table is also used for conventional CAC operation. The call admission management table can contain N records and has the following fields: Index D41, Line Number D42, VPI value D43, VCI value D44, Assigned bandwidth D45, and Type of traffic D37. The fields D41-D44 and D46 are the same as those of the cell traffic management table 21 as described before. The Assigned bandwidth D45 indicates the bandwidth currently used or occupied by CBR/VBR/UBR-traffic virtual connections. Therefore, by referring to the call admission management table and the cell traffic management table 21, as described hereafter, the call admission decision manager 12 can determine whether a connection request is accepted. It is possible to add the Assigned-bandwidth field D45 to the cell traffic management table 21.

OPERATION

Referring to Fig. 3, when receiving a QoS-specified connection request for a CBR/VBR-traffic virtual connection, the SVC call controller 11 extracts requested bandwidth and traffic type parameters from the request. The extracted parameters with the respective identification numbers of the input and output line modules involved are output to the call admission decision manager 12 (step (a)).

The call admission decision manager 12 inquires the cell traffic computation section 13 about the bandwidth currently assigned to UBR-traffic virtual connections on the

involved input and output line modules (step (b)).

As described before, the cell traffic computation section 13 receives the receiving and transmitting cell counts from cell counters 51 and 52 in the input line module and the output line module involved in a corresponding virtual connection (steps (c) and (d)). Then, the cell traffic computation section 13 uses the receiving and transmitting cell counts to create a record including Average reception/transmission traffic in the cell traffic management table 53. Therefore, in response to the inquiry from the call admission decision manager 12, the cell traffic computation section 13 adds up N records to calculate an average reception/transmission traffic of all UBR-traffic virtual connections currently established in the input and output line modules. The average reception/transmission traffic of the existing UBR-traffic virtual connections is sent back as an estimated UBR traffic to the call admission decision manager 12 (step (f)).

The call admission decision operation will be described with reference to Fig. 4A.

Referring to Fig. 4A, the call admission decision manager 12 calculates the bandwidth A_{QOS} already assigned to the CBR/VBR-traffic virtual connections by referring to the Assigned bandwidth field D45 of the call admission management table (see Fig. 2B). Further, the call admission decision manager 12 receives the estimated UBR traffic from the cell traffic computation section 13 and calculates an

average bandwidth A_{UBR} as an estimated bandwidth to be assigned to the existing UBR-traffic virtual connections. In other words, as shown in Fig. 4A, of the full bandwidth of a line is B, the portion A_{QOS} is already assigned to CBR/VBR traffic virtual connections and the average bandwidth A_{UBR} is assumed to be already assigned to UBR traffic virtual connections.

In this case, if the requested bandwidth R of the CBR traffic virtual connection is smaller than the available bandwidth $A_F = (B - A_{QOS} - A_{UBR})$, then the connection request is accepted because the existing UBR traffic virtual connections are substantially protected. If the requested bandwidth R of the CBR traffic virtual connection is greater than the available bandwidth $A_F = (B - A_{QOS} - A_{UBR})$, then the connection request is denied as shown in Fig. 4A. If the connection request were accepted in this condition, then the existing UBR-traffic virtual connection would be suddenly disconnected or impaired. According to the present embodiment, such a sudden disconnection or impairment of the existing UBR-traffic virtual connection can be avoided. Such a call admission decision result is sent back to the SVC call controller 11 (step (g)).

ANOTHER EMBODIMENT

Another embodiment of the present invention is obtained by replacing the cell traffic management table 21 as shown in Fig. 1 with a cell traffic management database and changing the cell traffic computation program of the cell

traffic computation section 13.

As shown in Fig. 5, the cell traffic management database stores a history of cell traffic management table, that is, not only a cell traffic management table at time instant t_n but also past cell traffic management tables at time instants t_{n-1}, t_{n-2}, ... At each of time instants t_n, t_{n-1}, t_{n-2}, ... , as described before, the cell traffic computation section 13 calculates a first average reception/transmission traffic of all UBR-traffic virtual connections currently established in the input and output line modules.

According to this embodiment, in response to the inquiry from the call admission decision manager 12, the cell traffic computation section 13 calculates an estimated average reception/transmission traffic of all UBR-traffic virtual connections currently established in the input and output line modules by adding up first average reception/transmission traffics obtained over a time period from the current time instant t_n to the predetermined past time instants t_{n-1}, t_{n-2}, ... Therefore, even in the case of burst-like UBR traffic, a more equitable call admission control can be achieved.

Alternatively, it is possible to sequentially store UBR traffic obtained each time the switching of the ATM switch for UBR traffic is performed. Such UBR traffic data can be used to achieve the similar advantage.

Since the present embodiment can be implemented by only

changing the call admission control software of the call admission decision manager 12, the flexible and reliable CAC can be achieved even in the case of LAN emulation environment without changing in hardware. Therefore, a flexible control and an effective utilization of bandwidth in an ATM network become possible.

What is claimed is:

1. A call admission control method in an ATM switch, comprising the steps of:

a) receiving a QoS (Quality of Service) specified connection request;

b) calculating an assigned bandwidth on a link associated with the QoS-specified connection request;

c) calculating an estimated bandwidth to be assigned to an existing QoS-unspecified traffic on the link associated with the QoS-specified connection request; and

d) determining whether the QoS-specified connection request is accepted, based on a combination of the assigned bandwidth and the estimated bandwidth.

2. The call admission control method according to claim 1, wherein in the step (c), the estimated bandwidth on the link is obtained based on an average QoS-unspecified traffic of each QoS-unspecified virtual connection existing on the link associated with the QoS-specified connection request.

3. The call admission control method according to claim 2, wherein the average QoS-unspecified traffic is calculated by adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals.

4. The call admission control method according to claim 1, wherein the step (c) comprises the steps of:

c.1) adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals to produce a first average QoS-unspecified traffic;

c.2) sequentially storing a first average QoS-unspecified traffic each time a corresponding QoS-unspecified connection is established at the ATM switch; and

c.3) calculating the estimated bandwidth by averaging a predetermined number of first average QoS-unspecified traffics stored.

5. The call admission control method according to claim 1, wherein the step (d) comprises the steps of:

d.1) adding the assigned bandwidth and the estimated bandwidth to produce an currently assigned bandwidth in the link;

d.2) calculating an available bandwidth of the link by subtracting the currently assigned bandwidth from a full bandwidth of the link; and

d.3) determining whether the QoS-specified connection request is accepted, depending on a comparison of the available bandwidth and a requested bandwidth of the QoS-specified connection request.

6. A call admission control system in an ATM switch

having a plurality of links connected thereto, comprising:

a traffic monitor for monitoring a QoS-unspecified traffic for each QoS-unspecified connection existing on each link;

a memory for storing a cell traffic management table containing an average QoS-unspecified traffic for each QoS-unspecified connection existing on each link; and

a call admission manager for calculating an estimated bandwidth by adding up average QoS-unspecified traffics for all existing QoS-unspecified connections on a link associated with a QoS-specified connection request, wherein the estimated bandwidth is a bandwidth to be assigned to the existing QoS-unspecified connections on the link, and determining whether the QoS-specified connection request is accepted, based on a combination of the estimated bandwidth and an assigned bandwidth that is already assigned in the link.

7. The call admission control system according to claim 6, wherein an average QoS-unspecified traffic is calculated by adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals.

8. The call admission control method according to claim 6, wherein the call admission manager adds the assigned bandwidth and the estimated bandwidth to produce an currently assigned bandwidth in the link, calculates an

available bandwidth of the link by subtracting the currently assigned bandwidth from a full bandwidth of the link, and determines whether the QoS-specified connection request is accepted, depending on a comparison of the available bandwidth and a requested bandwidth of the QoS-specified connection request.

9. A call admission control system in an ATM switch having a plurality of links connected thereto, comprising:

a traffic monitor for monitoring a QoS-unspecified traffic for each QoS-unspecified connection existing on each link;

a calculator for adding up existing QoS-unspecified traffics obtained at predetermined sampling time intervals to produce a first average QoS-unspecified traffic, , and calculating the estimated bandwidth by averaging a predetermined number of first average QoS-unspecified traffics stored;

a memory for storing a cell traffic management database sequentially containing a first average QoS-unspecified traffic each time a QoS-unspecified connection is established at the ATM switch; and

a call admission manager for calculating an estimated bandwidth by adding up first average QoS-unspecified traffics for all existing QoS-unspecified connections on a link associated with a QoS-specified connection request, wherein the estimated bandwidth is a

bandwidth to be assigned to the existing QoS-unspecified connections on the link, and determining whether the QoS-specified connection request is accepted, based on a combination of the estimated bandwidth and an assigned bandwidth that is already assigned in the link.

10. The call admission control method according to claim 9, wherein the call admission manager adds the assigned bandwidth and the estimated bandwidth to produce an currently assigned bandwidth in the link, calculates an available bandwidth of the link by subtracting the currently assigned bandwidth from a full bandwidth of the link, and determines whether the QoS-specified connection request is accepted, depending on a comparison of the available bandwidth and a requested bandwidth of the QoS-specified connection request.

ABSTRACT OF THE DISCLOSURE

A call admission control technique allowing flexible and reliable call admissions at an ATM switch in the case of an ATM network including both QoS-specified and QoS-unspecified virtual connections is disclosed. In the case where a QoS (Quality of Service) specified connection request occurs, an estimated bandwidth is calculated which is to be assigned to an existing QoS-unspecified traffic on the link associated with the QoS-specified connection request. A call control processor of the ATM switch determines whether the QoS-specified connection request is accepted, depending on whether a requested bandwidth is smaller than an available bandwidth that is obtained by subtracting an assigned bandwidth and the estimated bandwidth from a full bandwidth of the link.

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FIG. 1

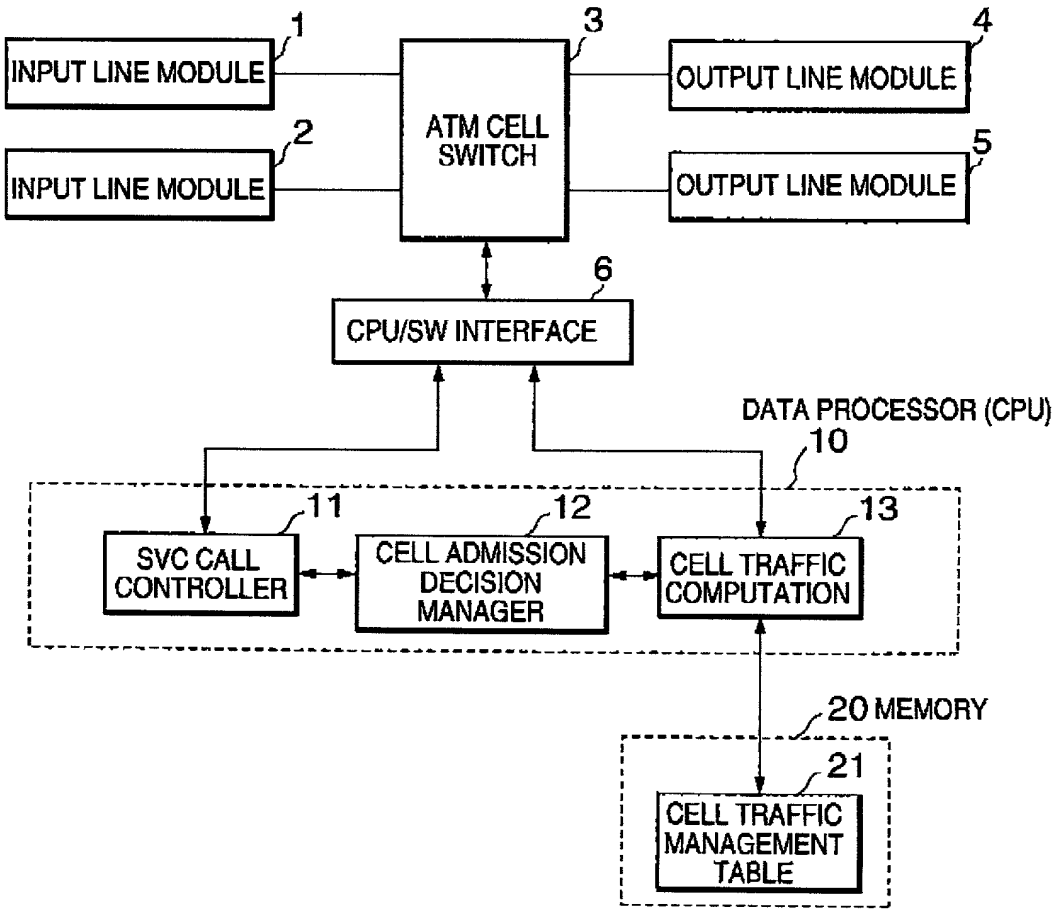
INPUT LINE MODULE
1
INPUT LINE MODULE
2
ATM CELL SWITCH
3
OUTPUT LINE MODULE
4
OUTPUT LINE MODULE
5
CPU/SW INTERFACE
6
DATA PROCESSOR (CPU)
10
SVC CALL CONTROLLER
11
CELL ADMISSION DECISION MANAGER
12
CELL TRAFFIC COMPUTATION
13
20 MEMORY
CELL TRAFFIC MANAGEMENT TABLE
21

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FIG. 2A

CELL TRAFFIC MANAGEMENT TABLE

D31 INDEX	D32 LINE NO.	D33 VPI	D34 VCI	D35 AVERAGE RECEPTION TRAFFIC(ART)	D36 AVERAGE TRANSMISSION TRAFFIC(ATT)	D37 TYPE OF TRAFFIC
1						
2						
⋮						
N						

FIG. 2B

CELL ADMISSION MANAGEMENT TABLE

D41 INDEX	D42 LINE NO.	D43 VPI	D44 VCI	D45 ASSIGNED BANDWIDTH	D46 TYPE OF TRAFFIC
1					
2					
⋮					
N					

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FIG. 3

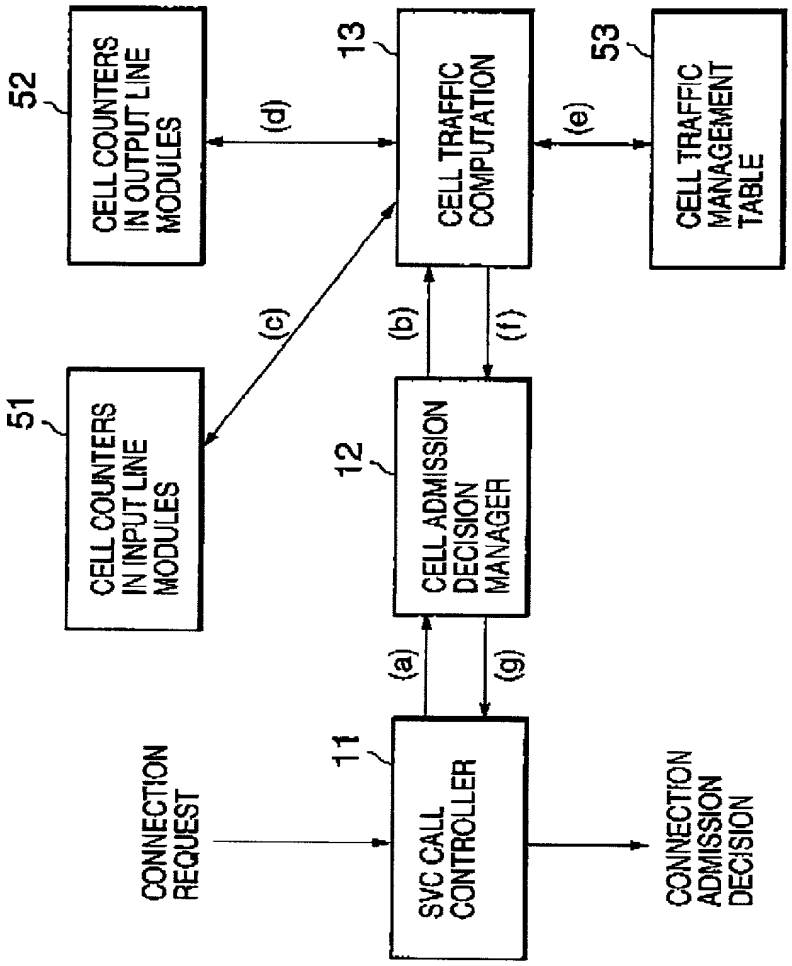
CONNECTION REQUEST
11
SVC CALL CONTROLLER
CONNECTION ADMISSION DECISION
(a)
(g)
12
CELL ADMISSION DECISION MANAGER
(b)
(f)
13
CELL TRAFFIC COMPUTATION
(c)
(d)
(e)
51
CELL COUNTERS IN INPUT LINE MODULES
52
CELL COUNTERS IN OUTPUT LINE MODULES
53
CELL TRAFFIC MANAGEMENT TABLE

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FIG. 4A

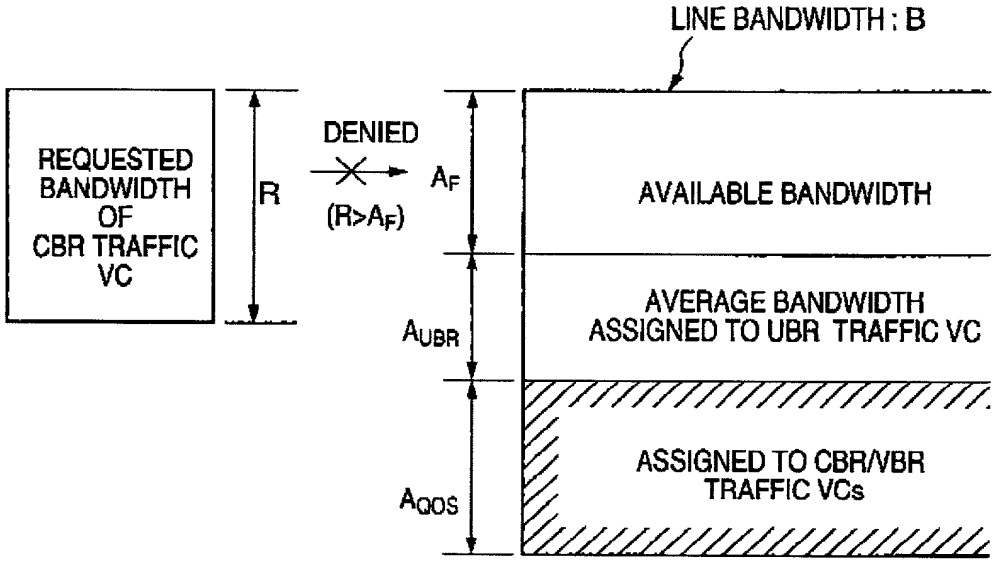

FIG. 4B (PRIOR ART)

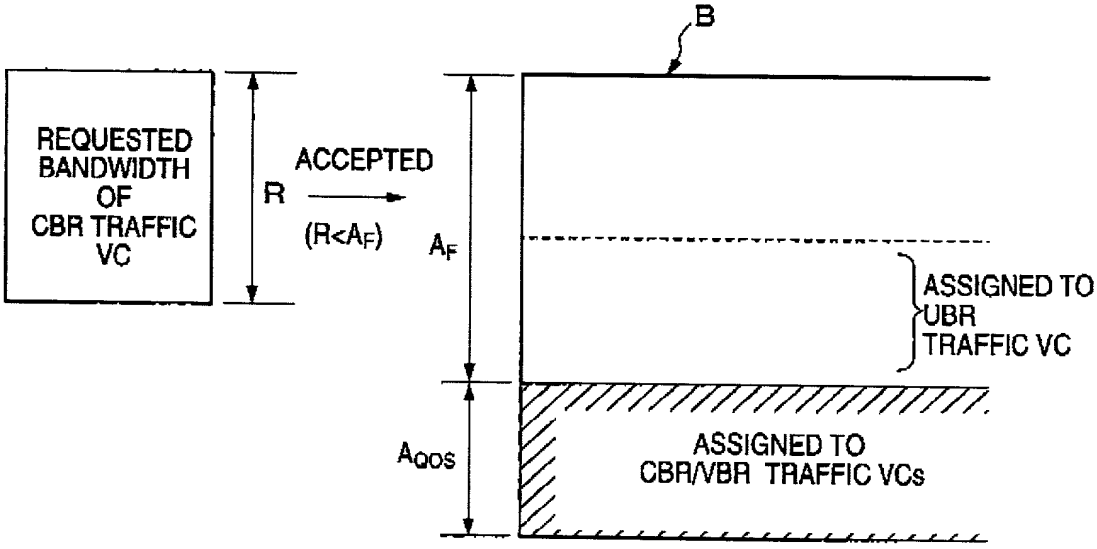

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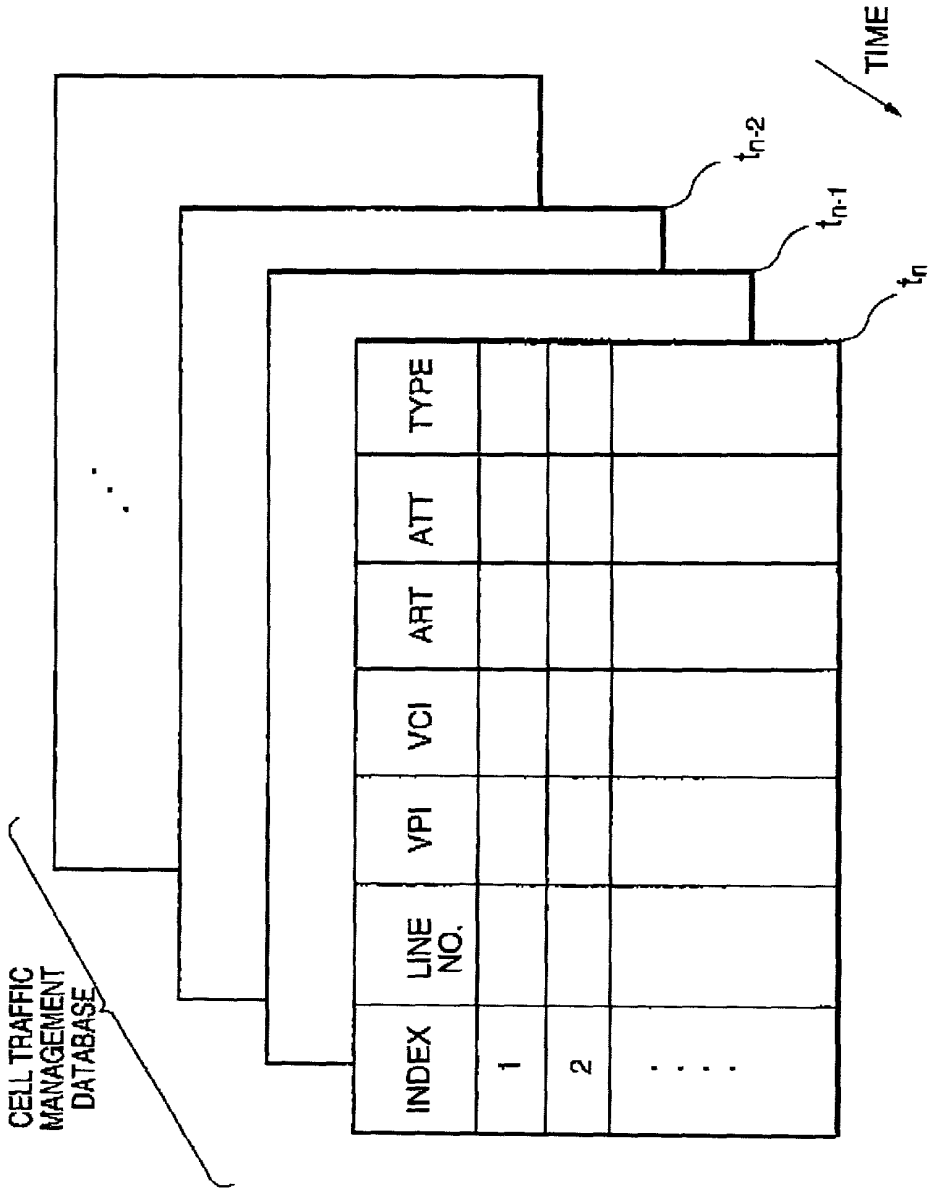
FIG. 5


TIME
t_{n-2}
t_{n-1}
t_n
CELL TRAFFIC MANAGEMENT DATABASE
INDEX
LINE NO.
VPI
VCI
ART
ATT
TYPE
1
2

Ref. Pat US1

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

CALL ADMISSION CONTROL METHOD AND SYSTEM

the specification of which: *(check one)*

REGULAR OR DESIGN APPLICATION

[X] is attached hereto.

[ ] was filed on _____ as application Serial No. _____ and was amended on _____ (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

[ ] was described and claimed in International application No. _____ filed on _____ and as amended on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

PRIORITY CLAIM

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

Country	Application Number	Date of Filing (day, month, year)	Priority Claimed
Japan	199510/1999	13, 07, 1999	YES

(Complete this part only if this is a continuing application.)

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (Filing Date) (Status--patented, pending, abandoned)

POWER OF ATTORNEY

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from ___ _____ as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: **Robert J. PATCH, Reg. No. 17,355, Andrew J. PATCH, Reg. No. 32,925, Robert F. HARGEST, Reg. No. 25,590, Benoît CASTEL, Reg. No. 35,041, Eric JENSEN, Reg. No. 37,855, and Thomas W. PERKINS, Reg. No. 33,027**, c/o YOUNG & THOMPSON, Second Floor, 745 South 23rd Street, Arlington, Virginia 22202.

Address all telephone calls to Young & Thompson at 703/521-2297.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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